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# Does risk-information processing differ as a function of risk status?

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Does risk-information processing differ as a function of risk status?

by

Amy Elizabeth Houlihan

A thesis submitted to the graduate faculty  
in partial fulfillment of the requirements for the degree of  
MASTER OF SCIENCE

Major: Psychology

Program of Study Committee:  
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has met the thesis requirements of Iowa State University

Signatures have been redacted for privacy

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## ABSTRACT

The present study sought to examine potential differences in risk information processing among different groups of college-age men. The study was based on the Prototype/Willingness model of adolescent health risk behavior, a modified dual-process model. Dual-process theories posit that there are two distinct systems of processing. The rational system is deliberate and analytical and requires greater time and effort. In contrast, the experiential system operates more quickly, is less reasoned, and is influenced by affect, heuristics, and images. Adolescents who score high on behavioral willingness (BW) and low on behavioral intention (BI) are considered at-risk because it is likely that they will engage in risk behavior, but it is unlikely that they will take precautions to protect themselves from the negative consequences of that behavior. They are unlikely to protect themselves because they have no plans to engage in the behavior; therefore, they do not tend to feel vulnerable to the consequences of that behavior. It was hypothesized that these at-risk adolescents would demonstrate a tendency, more so than other adolescents, to employ the experiential system when processing risk information.

Male college students were categorized into three groups based on their baseline BI and BW: low BI/low BW, high BI/high BW, and at-risk (low BI/high BW). All participants read about a fictional peer (an exemplar) who engages in casual sex and contracts an STD. The experimental conditions differed in the favorability of the exemplar described. In one condition, the exemplar was outgoing, likeable, and hard-working, and in the other he was apathetic, less social, and less likeable. Following the manipulation, participants read factual information about STDs. Dependent measures included BI and BW to engage in casual sex, exemplar favorability, absolute and conditional perceived risk, recall of the STD information, and response times to all of the measures. Results indicated that, in general, at-risk participants did not tend to use an experiential processing style more than the other

two groups did. There was evidence that the at-risk group paid more attention to risk information and spent more time deliberating about their intentions, indicators of more rational processing. Future research needs to replicate these findings and apply them to interventions aimed at discouraging at-risk adolescents from engaging in risk behavior.

## INTRODUCTION

### **Models of Health Decision-making**

Expectancy-value theories, such as the theory of reasoned action (Fishbein & Ajzen, 1975) and the theory of planned behavior (Ajzen, 1985), have been used most often to examine health behavior. The theory of reasoned action (TRA) assumes that decision-making processes are reasoned (i.e. they involve some forethought and planning). This forethought then leads to a behavioral intention (BI), or a decision to act or not. In the TRA, BI stems from the combination of one's attitudes toward the behavior, which include perceptions of the behavior and expected outcomes of the behavior, and subjective norms, or perceptions of what others are doing and/or would want one to do. To increase the predictive ability of the TRA, the theory of planned behavior (TPB) adds the construct of perceived behavioral control, the perception of one's ability to perform the behavior, as an antecedent to BI.

Both theories have been shown to be significant predictors of a variety of health behaviors, such as dieting (Schifter & Ajzen, 1985), exercise (Godin, Valois, & Lepage, 1993), health screening (McCaul, Sandgren, O'Neil, & Hinsz, 1993), and dental hygiene behaviors (McCaul, O'Neill, & Glasgow, 1988). Some researchers have also found support for the TRA in predicting sexual behavior. Gillmore et al. (2002) found support for the theory in that adolescents' intentions to have sex predicted their behavior one year later, and their attitudes and subjective norms predicted their intentions. Morrison, Gillmore, & Baker (1995) also found support for the TRA in regard to condom use among high-risk adults. In general, intentions to use condoms were predictive of subsequent condom use. However, this relationship between intention and behavior was much stronger for condom use with steady partners than for condom use with casual partners. It is possible that sex



with a steady partner tends to be a more intentional (premeditated) behavior than does sex with a casual partner.

This finding is evidence of the limitations of the TRA and the TPB in predicting risk behaviors. These two theories are successful at predicting behavior that is reasoned and planned but are less effective at predicting unplanned, irrational behavior. Much risky behavior is neither reasoned nor planned (Gibbons, Gerrard, Blanton, & Russell, 1998). The results of Morrison et al. illustrate this important distinction. Furthermore, reasoned models of behavior have been less effective at explaining behaviors that are impulsive or irrational (Ingham, Woodcock, & Stenner, 1992), socially undesirable (Beck & Ajzen, 1991), or have a significant affective component (Eiser, Eiser, & Pauwels, 1993), all of which are characteristics of adolescent risk behaviors.

### **Dual-Process Models**

A new generation of models has addressed these issues by diverging from the TRA and TPB approach (i.e. considering only reasoned cognitive processing) by conceptualizing cognitive processing as occurring in two systems or paths. For example, Epstein and Pacini (1999) have proposed the Cognitive-Experiential Self-Theory in which people operate by means of two information-processing systems that are distinct but work in parallel and can interact with each other. The rational system is a conscious, deliberative, and analytical mode of processing (similar to that in TRA and TPB) that is both intentional and effortful. In addition, they propose an experiential system that is less reasoned and effortful. Processing in the experiential system employs heuristics, schemas, and images, and it tends to happen much more rapidly than rational processing. The experiential system is also more influenced by affect than is the rational system.

### **Prototype / Willingness Model**

Because adolescent risk behavior often occurs without the forethought described by expectancy-value theories, and because adolescents' intentions often do not predict their risky behavior very well, Gibbons and Gerrard developed a new model to better explain these particular types of behaviors. The prototype/willingness (P/W) model of adolescent health risk behavior (Gibbons & Gerrard, 1995; 1997; Gibbons, Gerrard, & Lane, 2003) is a modified dual-processing model in that it describes two pathways to risk behavior. The reasoned pathway reflects the fact that some adolescents make a conscious decision to engage in risk behavior or are guided by intentions to avoid risk behavior. The second pathway is more reactive and less deliberate than the first. It acknowledges that adolescent risk behavior is often a reaction to a risk-conducive situation rather than a preplanned action. At the heart of the P/W model is the construct of behavioral willingness (BW). BW represents an openness to risk opportunity and an acknowledgement that one might engage in an (unplanned) behavior under certain circumstances. Of course, BW is correlated with BI, but the two are distinct constructs. Compared to adults, adolescents typically report a greater discrepancy between BI and BW; BW is generally the better predictor of health risk behavior of the two for younger people (Gibbons & Gerrard, 1997; Gibbons, Gerrard, Blanton et al., 1998).

### **Perceived Risk**

Another important distinction between BI and BW is that BI, more so than BW, is associated with an acknowledgement of risk. In other words, people who intend to engage in risk behavior typically acknowledge that there are potential negative consequences of that behavior. However, people who engage in risk behavior via the social reaction path do not necessarily acknowledge the corresponding risks and report lower perceived vulnerability to negative consequences than do people who follow the reasoned path.

People who follow the social reaction path are not oblivious to the negative consequences, but, rather, tend to avoid thinking about them (Gerrard, Gibbons, Benthin, & Hessling, 1996). Because measures of perceived risk often confound expectations, intentions, and current risk behavior, two distinct measures are often employed. Absolute perceived risk measures refer to the perceived likelihood that a negative event will occur (e.g., "What is the risk that you will contract an STD in the future?"). Conditional perceived risk measures are designed to elicit consideration of expected and intended future behavior (thus avoiding the confounding that occurs with absolute measures), and they are usually phrased in the subjunctive (e.g., "If you were to have unprotected sex, what is the risk that you will contract an STD in the future?"). Both types of measures were employed in the current study to better capture participants' perceptions of risk.

### **Prototypes**

A second central element of the P/W model is images or prototypes of the type of person who engages in a particular behavior. Among adolescents, risk behaviors are usually social behaviors that carry with them clear social images. Adolescents recognize that if they engage in a risk behavior, they will acquire aspects of the corresponding image (Gibbons & Gerrard, 1997). Although prototypes tend to be negative images (i.e. they do not represent goal states for adolescents), adolescents who hold more favorable prototypes are more likely to report greater BW and to eventually engage in that risk behavior than are those who hold less favorable prototypes. For example, in one study, adolescents' perceptions of the typical unwed teenage parent predicted their willingness to have sex without contraception (Gibbons, Gerrard, Boney-McCoy, 1995; Gibbons, Helweg-Larsen, & Gerrard, 1995). Gibbons, Gerrard, and their colleagues have shown that prototypes predict a number of risk behaviors, including drinking (Gibbons & Gerrard, 1995; Blanton, Gibbons, Gerrard, Conger, & Smith, 1997), reckless driving (Gibbons &



Gerrard, 1995), smoking (Gibbons, Helweg-Larsen et al., 1995) and contraceptive use (Gibbons & Gerrard, 1995). More recent work has shown that risk images influence behavior via the social reaction path (i.e. via BW rather than BI). For example, Gerrard et al. (2002) demonstrated that (relatively) favorable drinker prototypes were positively associated with subsequent alcohol consumption, and this path was mediated by BW.

### **Social Comparison Moderation**

The P/W model is a social comparison (SC) model in that it makes the assumption that prototypes influence behavior through a social comparison process. More specifically, it assumes that adolescents compare themselves with images, although they vary in the extent to which they make these comparisons. For example, Gibbons and Gerrard (1995) found that 80% of adolescents indicated that they had previously thought about the typical person who engages in a particular behavior (e.g., reckless driving, smoking). Thus, the second assumption is that social comparison moderates the relation between images and behavior, and prototypes are most influential among adolescents who are most likely to socially compare. In other words, there is a stronger relation between the favorability of a prototype and behavior for adolescents above the median on SC than for those below the median (as measured by an individual difference scale of social comparison tendencies: Iowa Netherlands Comparison Orientation Measure, Gibbons & Buunk, 1999). Gibbons and Gerrard (1995) found support for this assumption in the form of significant prototype x social comparison level interactions in predicting male and female adolescents' reckless driving and ineffective contraceptive use and males' smoking and drinking behavior. In each case, the interaction revealed that the predictive power of the prototype was significantly greater for participants who were high (as opposed to low) in SC tendencies. In short, a tendency to compare oneself to the relevant prototype seems to be a prerequisite for that prototype to influence behavior.

### **At-risk Adolescents**

Because BW and BI are correlated, and because BW tends to be greater and develop earlier than BI, an interesting group of adolescents has been identified in previous studies. These adolescents, typically representing 15 - 20% of the population, indicate that they are not intending to engage in specific risk behaviors but they might engage in them under certain circumstances (Gibbons, Gerrard, Ouellette, & Burzette, 1998; Gibbons, Lane, Gerrard, Eggleston, & Reis-Bergan, 2006). More precisely, on Gibbons and Gerrard's measures, this group scores above the median on willingness and below the median (often at zero) on intention. This group of adolescents is more at-risk than others, even those who acknowledge that they intend to engage in risk behaviors. Adolescents who intend to have sex, for example, are putting themselves at some risk of course; however, they also are more likely to take precautions ahead of time, such as using the pill or having a condom available (Gerrard, 1982; 1987). In contrast, those who are willing, but not intending or planning to take risks, often do not prepare for them. For example, they do not carry condoms or arrange for a designated driver, because they have no intention of having sex or getting drunk. Weinstein (1988) argues that people must perceive that they are at risk before they will act to protect themselves. Because they are not intending to take risks, these at-risk adolescents are not likely to feel vulnerable to risk and therefore not likely to take necessary precautionary actions (Gibbons, Gerrard, Ouellette et al., 1998). This group is more likely to follow the social reaction path to risk behavior; the decisions they make will depend largely on their social circumstances. If they are in risky situations, they are likely to experiment with the behavior. For instance, in one study, 50% of at-risk adolescents (i.e. those who scored high on BW and low on BI at Time 1) who lived in high-risk neighborhoods (i.e. neighborhoods that have a high incidence of crime and drug availability) reported experimenting with substances 20 months later (Gibbons et



al., 2004). In contrast, only approximately 22% of the sample as a whole reported any substance use at Time 2.

As Gibbons, Gerrard, and their colleagues have noted, these at-risk (who report high BW and low BI) adolescents are a logical group to target in interventions (Gibbons, Gerrard, Ouellette et al., 1998; Gibbons, Gerrard, & Pomery, 2003). Because they are not yet intending to engage in risky behavior (i.e. they are not committed to the behavior), they should be more receptive to efforts to dissuade them. Most adolescents, regardless of where they score on measures of BI and BW, base their decisions to engage in risky behaviors at least partly on misperceptions. For example, adolescents often overestimate the prevalence of risk behaviors among their peers and the extent to which their peers condone risk behavior. Interventions that educate adolescents about these misperceptions decrease risk behavior such as substance use (e.g., Schroeder & Prentice, 1998). In addition, a recent intervention that taught adolescents about BW and its distinctions from BI reduced willingness to engage in risky behavior (Gerrard et al., in press). Lab studies that alter risk prototypes have also been shown to reduce BW (Eggleston, 1997; Blanton et al., 2001).

Thus, recent research has clarified much about adolescents' thought processes concerning risk behaviors and their health decisions, in general. Little is known, however, about the differences between the thought processes of these at-risk adolescents and that of other adolescents. For example, are they more influenced by social comparison than other adolescents are? Are at-risk adolescents more likely than others to change their willingness after receiving risk information? Compared to their peers, are they less likely to carefully process risk information, and are they less likely to acknowledge personal risk? Finally, is there specific risk information that the at-risk adolescents are likely to attend to and recall? The P/W model predicts that at-risk adolescents are more likely to follow the

social reaction path to risk behavior and to process information through the experiential system, rather than through the rational system. If the model is correct, these adolescents will be more influenced by images (prototypes) and social comparison than other adolescents are. Furthermore, compared to others, their willingness to engage in risk behavior will be more malleable, and they will report less perceived risk to the consequences of risky behavior.

### **Trends in Sexual Behavior and STDs**

This study attempted to shed light on these questions by examining how different groups of college-age men process risk information. More specifically, the study focused on the risks associated with casual sex (i.e. sexually transmitted disease) because views of premarital sex have become increasingly permissive (Caron & Moskey, 2002), and sexual activity (with both steady and casual partners) is common among both adolescents and young adults. The 2003 *Youth Risk Behavior Surveillance System*, a report published biannually by the Centers for Disease Control, indicates that about 62% of twelfth grade students report ever having had sex, and 49% report having had sex in the past three months (CDC, 2004). Perhaps more striking is the number of sexual partners adolescents report having. Among adolescents ages 15-17 who had engaged in sexual intercourse, 39% reported having two to five lifetime partners, and 11% reported having six or more partners (Hoff, 2003). It is likely that adolescents reporting high numbers of sexual partners are engaging in casual sex (defined as sex with a partner one does not know well or is not exclusively dating). Few data have been collected on the percentage of adolescents who engage in casual sex; however, one study found that by young adulthood (mean age = 23), 80% of men and 59% of women have experienced casual sex (Herold & Mewhinney, 1993). Due to the alarming prevalence of STDs among this age group, casual sex is a relevant health concern as well as an important research area. For instance, it is estimated



that in the year 2000, 48% of new STD cases occurred in people aged 15 to 24, even though this group represents only 25% of the sexually experienced population aged 15 to 44 (Weinstock, Berman, & Cates, 2004).

### **Gender Differences in Casual Sex**

Many studies have documented large gender differences in regard to casual sex. For example, men tend to have more favorable attitudes toward casual sex than women do (Oliver & Hyde, 1993; Buss & Schmitt, 1993). Male adolescents grow increasingly accepting of casual sex as they age, whereas female adolescents do not (Chara & Keunnen, 1994). Clark and Hatfield (1989) demonstrated that men are more willing to engage in sex with a casual partner. In this study, a confederate approached opposite sex students and asked them either to go on a date with the confederate, to go to the confederate's apartment, or to have sex with the confederate. Equal percentages of men and women were willing to accept the date, but only men were willing to go to the confederate's apartment or to have sex with the confederate. In addition to holding more favorable attitudes toward casual sex and being more willing to engage in casual sex, men are also more likely than women to report having had some experience with casual sex in the past and are more likely to anticipate having casual sex in the future (Herold & Mewhinney, 1993). Because of their more permissive attitudes and greater likelihood of having casual sex, only male participants were included in the current study. Furthermore, because a double standard exists in which people react more negatively to a woman who engages in casual sex than to a man who does the same (Gentry, 1998; Kaats & Davis, 1970), the exemplar (SC target) described in the study was also male.

Because casual sex is a risky yet not uncommon behavior among adolescents, the proposed study focused on this particular behavior to examine how adolescents process risk information. More specifically, it attempted to examine individual differences (i.e. how

willing and intending the adolescents are to engage in casual sex) and risk information processing. The study also examined the role of social comparison as a potential moderator of these differences in risk processing.

## STUDY OVERVIEW AND HYPOTHESES

Participants were classified according to how they answered items regarding behavioral intention and willingness to engage in casual sex during a mass testing session early in the semester. Specifically, three groups were identified: those who scored high on both BW and BI ("high/high group"), those who scored low on both BW and BI ("low/low group"), and those who scored high on BW but low on BI ("at-risk group"). Mass testing respondents who (paradoxically) reported high intention but low willingness were not eligible to participate in the study.<sup>1</sup> The risk information was presented to participants in the form of a description of a male exemplar (who engages in casual sex) that was framed in either positive or negative terms (i.e. he was described as either popular and studious or as aloof and indolent). Thus, the design of the study was a 3 (BI/BW group: high/high, low/low, and at-risk) X 2 (exemplar favorability: positive and negative) factorial. The study examined how the descriptions of the peer affected participants' willingness and intention to engage in casual sex as well as their recall of the information presented and evaluation of the person described.

### Hypotheses

The following hypotheses were tested:

1. A main effect of BI/BW group was predicted such that at-risk participants, because of their tendency to process information experientially, will be more influenced than the other two groups by the description they read. This effect will be evidenced by a larger change in their prototype/exemplar evaluation and (related to that) their BW. More precisely, compared to the other groups, at-risk participants in the negative favorability condition are predicted to show a larger decrease in BW, and at-risk participants in the positive favorability condition are predicted to show a

larger increase in BW. However, BI is predicted to remain relatively unchanged across all three groups.

2. These effects will be moderated by participants' level of social comparison, such that participants who score high, as opposed to low, on social comparison will show more change in prototype/exemplar favorability and BW.

3. Because experiential processing is associated with avoidance of contemplation of negative consequences of risk behavior, there will be a BI/BW group main effect on absolute perceived risk and conditional perceived risk to the negative consequences of casual sex such that the at-risk group will score lower than the other two groups on both measures.

4. A main effect of BI/BW group on response time (i.e. the time it takes for participants to respond to the questionnaire item) was predicted such that at-risk participants, because experiential processing tends to be relatively rapid, will have shorter response times when answering the BW, BI, perceived risk, and exemplar favorability items than will the other two groups.

5. a) Because the at-risk group is hypothesized to evidence more rapid and less effortful processing, there will be a main effect of BI/BW group on exposure time such that at-risk participants will spend less time reading the STD risk information than will the other two groups.

b) Because they will tend to pay less attention to risk information, the at-risk group will recall less of the STD information than the other two groups will.



## METHOD

### Participants

Potential participants first completed measures of their sexual behaviors and attitudes, including BW and BI to engage in casual sex, during a mass testing session (Time 1, hereafter called T1). Median responses were calculated for the casual sex willingness (median = 5) and intention (median = 2.5) items. Potential participants were then classified into one of three groups (high/high, low/low, or at-risk) depending on whether or not they scored above or below the median on the two items. Eligible students (i.e. students whose responses indicated that they belonged in one of the three BI/BW groups) were contacted by phone and asked if they would like to participate in a study regarding the evaluation of news articles. Two-hundred-twenty students participated in the lab session (Time 2, hereafter called T2), and they each received one hour of research participation credit for their psychology course. Data from 30 participants were not included in the analyses due to computer malfunctions, and data from eight participants were excluded due to participants' suspicion about the study's hypotheses. This resulted in a final sample of 182 participants.

Participants' ages ranged from 18 to 23 with a mean age of 20.15. Approximately 27% of the participants were virgins at T1. Of the participants who were not virgins, most (61%) reported having one or two lifetime sexual partners. In general, participants reported relatively favorable attitudes toward casual sex at T1. They were, on average, much more willing to have casual sex ( $M = 4.68$  on 7-point scale) than intending to have casual sex ( $M = 2.62$  on a 7-point scale). On average, participants scored relatively high on social comparison level ( $M = 20.18$  on a scale from 6 to 30).

## Procedure

Students participated alone or in groups of two. When participants arrived in the lab, they were told that the purpose of the experiment was to examine the psychology of writing by evaluating the writing style and audience impact of news articles. The experimenter explained that each participant would read one of a dozen articles that may appear in a future special health series in the ISU Daily (in actuality only two different articles were used). Participants were also told that after reading the article, they would be asked to answer several questions about their impressions of the article as well as some questions about themselves.

After obtaining consent, the experimenter, who was kept blind to participants' BI/BW classification, randomly assigned each participant to the positive or negative favorability condition. Table 1 presents cell counts by exemplar favorability condition and BI/BW group.

**Table 1: Cell counts by exemplar favorability condition and BI/BW group**

	Low/Low Group	At-risk Group	High/High Group
Positive favorability condition	29	31	31
Negative favorability condition	31	30	30

*Note.*  $N = 182$ .

Participants were seated in individual experimental rooms to ensure privacy throughout the remainder of the experiment. All experimental materials were presented on a computer with MediaLab software. The experimenter instructed each participant to follow the directions presented on the computer screen. Participants read half of the article and were then asked to complete the exemplar favorability measures. Next, they read the rest of the



article and, finally, answered the remainder of the questionnaire items: BI, BW, absolute perceived risk, conditional perceived risk, and STD recall.

The first half of each article contained information about a fictional student's ("Zach") personality, academic performance, leisure activities, and sexual behavior. In the positive favorability condition, Zach was a good student and an overall likeable person who engaged in casual sex (see Appendix A). In the negative favorability condition, Zach also engaged in casual sex but was described as a poor student and a less likeable person (see Appendix B). After reading the first half of the article (i.e. the description of Zach), participants answered two items regarding the quality of the article (to correspond to the supposed purpose of the study) and evaluated Zach on the following dimensions: cool, careless, confident, attractive, and immature (see Appendix C). They were then prompted to read the remainder of the article.

The second half of the article was identical in both conditions (see Appendix D). It explained that Zach had contracted an STD and described his reaction to the diagnosis. Factual information about the prevalence and incidence of common STDs was also reported. Finally, participants completed the second portion of the questionnaire that assessed their BW and BI to engage in casual sex and their recall of the STD facts presented in the article. They were also asked open-ended questions about their impressions of Zach and their recall of the STD information (see Appendix E). When the questionnaire was completed, participants signaled the experimenter who then probed for suspicion before fully debriefing the participants.

## Measures

### Mass Testing (T1)

The following constructs were assessed during the mass testing session:

*Prototype favorability.* Participants were asked to think of the prototypical person who engages in casual sex. They were then asked to evaluate the prototype on five dimensions (attractive, careless, immature, cool, and confident) using a Likert-type scale from 1 (*not at all*) to 7 (*very*). An index of prototype favorability was constructed using the mean responses of these five items (T1  $\alpha = .71$ ).

*Behavioral intention.* Using a scale from 1 (*definitely not*) to 7 (*definitely*), participants were asked to report the extent to which they intended to have casual sex (i.e. "In the next 6 months, are you intending to have sex with someone you are not exclusively dating?").

*Behavioral willingness.* Participants were asked to read a hypothetical situation (e.g., they meet an attractive woman at a party who wants them to go home with her) and then to indicate how willing they would be to engage in certain behaviors if they were in that situation ("stay at her apartment and have oral sex," "stay at her apartment and have sex," and "stay at her apartment but don't have sex"). Each item was rated on a scale from 1 (*not at all willing*) to 7 (*very willing*). A BW index was constructed by averaging the responses of the first two items (T1  $\alpha = .86$ ; T2  $\alpha = .86$ ). The third item ("stay at her apartment but don't have sex") was dropped from the index because of the lower reliability when this item was included (T1  $\alpha = .76$ ; T2  $\alpha = .67$ ).

*Social comparison.* Participants completed a shortened version of the Iowa-Netherlands Comparison Orientation Measure (INCOM; Gibbons & Buunk, 1999). This version consists of 6 of the 11 statements (e.g., "I often compare myself to others with respect to what I have accomplished in life." "I always like to know what others in a similar

situation would do.”). Participants rated the degree to which they agreed with each statement on a scale from 1 (*I disagree strongly*) to 5 (*I agree strongly*). The responses of each item were summed to construct a social comparison index ( $\alpha = .70$ ).

*Sexual partners.* Participants were asked to report how many sexual partners they had had in their lifetime on a scale from 1 (*no partners*) to 10 (*12 or more partners*).

#### Experimental Session (T2)

BI and BW were assessed in the same manner during the experimental session as they were in mass testing. T2 included the following additional measures:

*Open-ended BW.* Participants responded to an open-ended question in which they were asked to explain their reasoning when answering the scaled BW items (“When making this decision, what specific things did you think about? In other words, what considerations influenced your decision?”). The open-ended responses were coded by two independent coders for indications of experiential vs. rational decision-making (e.g., mentioning making an impulsive decision vs. carefully weighing the benefits and consequences) on a scale from 0 (*experiential*) to 2 (*rational*). An open-ended BW index was created by averaging the scores of the two coders ( $\alpha = .70$ ).

*Exemplar favorability.* After reading about Zach, participants were asked to evaluate him on the same dimensions used in the prototype favorability measure (attractive, careless, immature, cool, and confident) using a Likert-type scale from 1 (*not at all*) to 7 (*very*). An exemplar favorability index was constructed using the mean responses of these five items (T2  $\alpha = .73$ ). Participants were also asked to respond to the open-ended question: “What are your impressions of Zach?” These responses were coded by two coders for overall favorability on a scale from 1 (*unfavorable*) to 7 (*favorable*). An open-ended favorability index was constructed by averaging the coders’ scores ( $\alpha = .90$ ).



*Absolute perceived risk (PR).* Participants were asked to rate how risky they think casual sex is on a scale from 1 (*not at all*) to 7 (*extremely*).

*Conditional perceived risk (PR).* Participants answered the question, "If you were to have casual sex, what do you think the chances are that you would get an STD?" on a scale from 1 (*very slim chance*) to 7 (*very good chance*).

*Recall.* At the end of the lab session, participants were asked an open-ended question about the STD information they read ("What information about STDs do you remember from the reading?"). Participants' responses were coded by two coders for accuracy on a scale from 0 (*zero correct statements*) to 4 (*three or more correct statements*). An open-ended recall index was created by averaging the two coders' scores ( $\alpha = .85$ ). In addition, participants answered three questions about the specific STD information presented in the article (e.g., "Among sexually transmitted infections in men, what percentage occurs without symptoms?"). Responses to the three STD recall measures were scored as a "1" if the answer was correct and a "0" if the answer was incorrect. A recall index was then constructed by summing the scores of the three individual items ( $\alpha = .34$ ).

*Response time.* The computer software used in the lab session measured response time in milliseconds to each questionnaire item. The response times for the five exemplar adjectives were combined into an index ( $\alpha = .71$ ), as were the response times for the two BW items ( $\alpha = .26$ ).

*Exposure time.* The computer software also recorded exposure time (how long each participant read the computer instructions and each half of the article) in milliseconds.

## RESULTS

### Randomization and Manipulation Checks

Random assignment to condition was checked by running analyses to test for differences in the T1 dependent variables by favorability condition. Independent-samples *t*-tests showed that there were no significant differences in T1 BI, BW, and prototype favorability between participants in the positive and negative favorability conditions (all *ps* > .45). Furthermore, participants in these two conditions did not significantly differ in their number of sexual partners (*p* > .70) or in their social comparison level (*p* > .80). Thus, randomization to favorability condition was achieved.

Analyses were conducted to ensure that the favorability of the student described in the article (Zach) was manipulated as intended. Specifically, independent-samples *t*-tests were conducted to test whether participants in the negative condition perceived Zach in less favorable terms than did participants in the positive condition. Results indicated that participants in the positive favorability condition rated Zach as more cool, more attractive, more confident, and less careless than did participants in the negative favorability condition (all *ts* > 3.99, all *ps* < .001). There was also a marginally significant difference between the two favorability conditions in the ratings of how immature Zach was (*t* = 1.75, *p* < .09). Furthermore, the positive and negative conditions differed in the overall exemplar favorability index (positive favorability *M* = 4.56, negative favorability *M* = 3.64, *t* = 7.44, *p* < .001). These differences indicate that the description of Zach was manipulated as intended.

## Descriptive Statistics

Table 2 presents the correlations among the primary dependent variables at T1 and T2.

**Table 2: Correlations between dependent variables at T1 and T2**

Variable	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
1. T1 BW	-	.62	.44	.71	.59	.23
2. T1 BI		-	.39	.54	.82	.22
3. T1 prototype favorability			-	.43	.40	.25
4. T2 BW				-	.63	.22
5. T2 BI					-	.24
6. T2 exemplar favorability						-

Note.  $r \geq .39$ ,  $p < .001$ ;  $r \geq .22$ ,  $p < .01$ .

One-way repeated measures ANOVAs revealed that, overall, participants marginally decreased their behavioral willingness from T1 to T2 (T1  $M = 4.90$ , T2  $M = 4.71$ ,  $F(1, 179) = 3.25$ ,  $p < .08$ ). However, participants' behavioral intention to have sex with a casual partner increased from T1 to T2 (T1  $M = 2.62$ , T2  $M = 2.82$ ,  $F(1, 179) = 5.18$ ,  $p < .03$ ). Overall, participants' ratings of Zach (the exemplar) at T2 did not significantly differ from their ratings of the prototypical person who engages in casual sex at T1 (T1  $M = 3.99$ , T2  $M = 4.12$ ,  $p > .15$ ). A favorability x time interaction revealed significant changes in prototype/exemplar favorability within each exemplar favorability condition, however ( $F(1, 177) = 27.53$ ,  $p < .001$ ). Participants in the positive favorability condition increased their ratings from T1 to T2 (T1  $M = 4.03$ , T2  $M = 4.61$ ), and participants in the negative favorability condition decreased their ratings from T1 to T2 (T1  $M = 3.96$ , T2  $M = 3.64$ ). Refer to Table 3 for descriptive statistics for the dependent variables by BI/BW group.



**Table 3: Means, standard deviations, ranges, and change scores for T1 and T2 BI, BW, prototype/exemplar favorability, absolute perceived risk, and conditional perceived risk by BI/BW group**

	<u>Low/Low</u>			<u>At-risk</u>			<u>High/High</u>		
	T1	T2	$\Delta$	T1	T2	$\Delta$	T1	T2	$\Delta$
Behavioral intention	1.12 (.32) 1 - 2	1.25 (.63) 1 - 4	.13	1.53 (.54) 1 - 2	2.25 (1.57) 1 - 7	.72	5.20 (1.33) 3 - 7	4.93 (1.59) 1 - 7	-.27
Behavioral willingness	2.43 (1.24) 1 - 5.5	3.12 (1.67) 1 - 7	.69	5.62 (1.23) 3 - 7	4.93 (1.47) 2 - 7	-.69	6.62 (.56) 5 - 7	6.07 (1.19) 2 - 7	-.55
Prototype /exemplar favorability	3.37 (1.20) 1 - 6	3.80 (.98) 1.6 - 6.4	.43	4.06 (.97) 1 - 6	4.16 (.93) 1.6 - 6.4	.10	4.52 (.61) 3 - 6	4.37 (.87) 2.6 - 6.6	-.15
Absolute PR	-	6.13 (.87) 3 - 7	-	-	5.34 (1.15) 3 - 7	-	-	4.75 (.98) 2 - 7	-
Conditional PR	-	4.82 (1.16) 2 - 7	-	-	4.10 (1.27) 2 - 7	-	-	3.59 (1.23) 1 - 6	-

Note. Possible range for all items = 1 – 7.

$\Delta$  = T2 mean score – T1 mean score.

Further analyses were conducted to determine if the changes in the dependent variables were moderated by BI/BW group, favorability condition, and social comparison level as hypothesized. Initially, regressions that included all three BI/BW groups in each equation were conducted. Because the at-risk group is the group of primary interest, two parallel sets of regression analyses were also conducted to compare the at-risk group to each of the other two groups separately. Because the two regression strategies yielded similar results, only the parallel sets of regressions are reported for a clearer presentation and interpretation of the findings. For both sets of comparisons, regressions were run for each of the T2 dependent variables: exemplar favorability, BW, BI, absolute PR, and

conditional PR, controlling for the T1 measure (where applicable). In addition, number of sexual partners, BI/BW group, favorability condition, social comparison, and the following interactions: favorability condition x social comparison, favorability condition x group, group x social comparison, and group x favorability condition x social comparison were entered into each regression equation. These regression models are illustrated by the following equation:

$$Y = \beta_0 + \beta_1 T1 + \beta_2 P + \beta_3 G + \beta_4 FC + \beta_5 SC + \beta_6 FC \times SC + \beta_7 FC \times G + \beta_8 G \times SC + \beta_9 G \times FC \times SC + E,$$

where T1 = T1 dependent variable, P = number of sexual partners, G = BI/BW group, FC = favorability condition, SC = social comparison level, and E = error.

#### **At-risk vs. Low BI/Low BW**

In the first set of regressions, the at-risk and low/low groups were compared. The group variable was dummy coded so that the at-risk group was set equal to "1" and the low/low group was set equal to "0."

#### Changes in prototype/exemplar favorability, BW, and BI

Hypothesis 1 makes the prediction that the at-risk participants will show a larger change in their prototype/exemplar favorability and their BW than the low/low participants. However, BI/BW group was not a significant predictor of change in prototype/exemplar favorability or change in the BW index, and the BI/BW group x SC interactions were not significant ( $ps > .10$ ). Furthermore, BI/BW group was not a significant predictor of the open-ended exemplar favorability index ( $p > .90$ ). Hypothesis 1 also predicted that there would be no change in BI across BI/BW groups. As shown in Table 3, participants in these two groups unexpectedly increased their BI from T1 to T2 ( $F(1, 119) = 16.31, p < .001$ ). However, BI/BW group was not a significant predictor of change in BI ( $p > .80$ ).



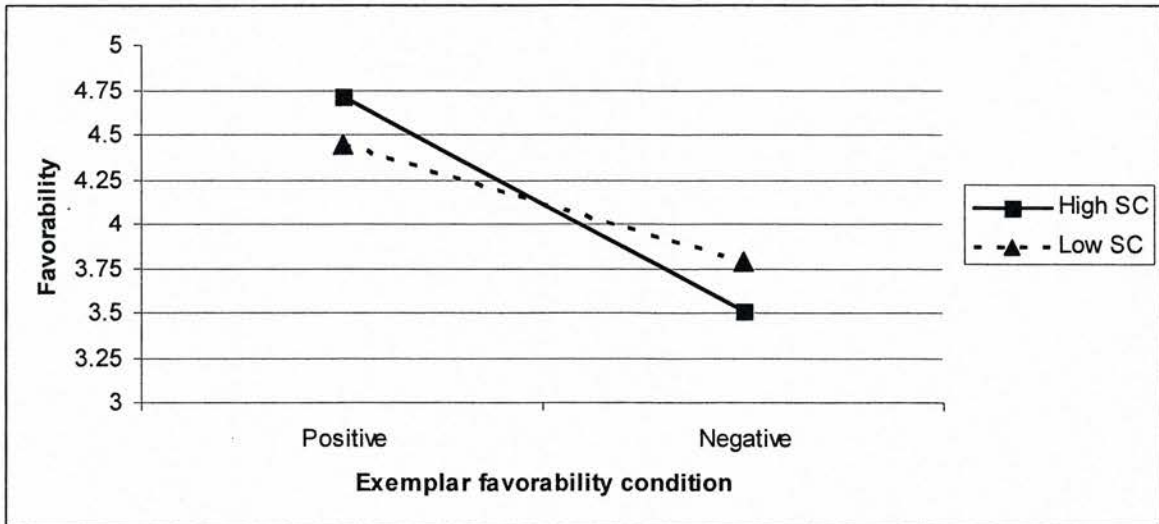
### Change in prototype/exemplar favorability as a predictor

Regressions were also run to determine if the difference from T1 prototype favorability to T2 exemplar favorability predicted change in BI and BW. The regression included the same variables as the above regressions with the addition of the T1 prototype and T2 exemplar indices (entered second and third, respectively, after the T1 measure). Results indicated that neither T1 prototype favorability nor T2 exemplar favorability significantly predicted BI or BW while controlling for the other ( $ps > .10$ ). Thus, Hypothesis 1 was not supported for the at-risk vs. low/low group comparisons.

### Social comparison moderation

There was some evidence in support of Hypothesis 2 (i.e. social comparison moderation). A 3 (BI/BW group) x 2 (favorability condition) x 2 (social comparison level) ANCOVA on exemplar favorability (in which T1 prototype favorability was the covariate) revealed a significant favorability x SC interaction ( $F(1, 162) = 5.10, p < .03$ ). As shown in Figure 1, examination of the simple main effects revealed that the high SC participants who read the positive description of Zach had the most favorable mean exemplar rating ( $M = 4.71$ ), although this was not significantly higher than the low SC participants' mean rating ( $M = 4.45, p > .15$ ). Similarly, the high SC participants who read the negative description had the least favorable mean exemplar rating ( $M = 3.51$ ), but this was not significantly lower than the low SC participants' mean rating ( $M = 3.79, p > .10$ ). This pattern indicates that high social comparers, as compared to low social comparers, were somewhat more responsive to the description of Zach.

**Figure 1. T2 exemplar favorability by social comparison level and exemplar favorability condition.**



#### Absolute and conditional perceived risk

Hypothesis 3 suggests that the at-risk group, compared to the other groups, will report less absolute perceived risk in regard to casual sex and less conditional perceived risk to the negative consequences of casual sex (i.e. contracting an STD). T2 absolute PR was not significantly predicted by BI/BW group ( $p > .30$ ). Similarly, BI/BW group was not a significant predictor of conditional PR ( $p > .95$ ). Note that, unlike the other dependent variables, change in absolute and conditional PR cannot be analyzed because these measures were not included at T1. In sum, there was no support found for Hypothesis 3.

#### **At-risk vs. High BI/High BW**

The second set of regressions was conducted to test the same three hypotheses comparing the at-risk group to the high/high group. For these analyses, the group variable was dummy coded such that the high/high group was set equal to "1" and the at-risk group was set equal to "0."

### Changes in prototype/exemplar favorability, BW, and BI

As with the first set of regressions, support for Hypotheses 1 and 2 was not found. BI/BW group was not a significant predictor of change in the scaled and open-ended prototype/exemplar favorability indices, BI, or BW ( $ps > .40$ ). The group  $\times$  social comparison interactions were also not significant, indicating that social comparison did not moderate the effect of BI/BW group ( $ps > .35$ ).

### Change in prototype/exemplar favorability as a predictor

As for the at-risk vs. low/low comparison analyses, regressions were run to determine if change in prototype/exemplar favorability predicted change in BI and BW. Results indicated that for BI, T2 exemplar favorability marginally predicted T2 BI while controlling for T1 prototype favorability ( $\beta = .13, p < .09$ ). This indicates that an increase in prototype/exemplar favorability from T1 to T2 predicted greater BI at T2. Consistent with the PW model, however, change in prototype/exemplar favorability no longer predicted T2 BI when controlling for T2 BW ( $p > .30$ ). Furthermore, T2 exemplar favorability significantly predicted T2 BW, while controlling for T1 prototype favorability, indicating that an increase in prototype/exemplar favorability from T1 to T2 predicted greater BW at T2 ( $\beta = .25, p < .02$ ). Moreover, the increase in prototype/exemplar favorability continued to predict BW (marginally) when T2 BI was controlled for ( $\beta = .19, p < .06$ ). For both BI and BW, there were no significant SC interactions ( $ps > .08$ ). Thus, for the at-risk vs. high/high group comparison, there is some evidence that change in prototype/exemplar predicted T2 BI and BW, and this effect was stronger for BW than for BI.

### Absolute and conditional perceived risk

There was no evidence in support of Hypothesis 3 for the second set of regressions. BI/BW group was not a significant predictor of absolute PR ( $p > .40$ ). Similarly, conditional PR was also not predicted by BI/BW group ( $p > .15$ ).



## Response Times

The fourth hypothesis stated that the groups will differ in their response times (RT) to BI, BW, exemplar favorability, absolute PR, and conditional PR during the experimental session. Specifically, the prediction was that the at-risk group, because of their relatively rapid experiential processing, will respond more quickly to these questions (i.e. have shorter response times) than the other two groups will. Because of their unequal variances, the response times were transformed by calculating cutoff scores one standard deviation above and below the mean. Scores that fell beyond one standard deviation from the mean were set equal to the cutoff scores, resulting in more consistent variances across BI/BW groups and favorability conditions. In general, the response times were not strongly correlated with the dependent variables, as shown in Table 4. However, BW was significantly correlated with its response time such that greater willingness was associated with shorter response times ( $r = -.26, p < .001$ ). The correlation between BW and BW RT was also calculated partialing out BI RT. Again, the relation was negative ( $r = -.30, p < .001$ ). In addition, greater absolute perceived risk was significantly correlated with shorter response times.

**Table 4. Correlations between T2 dependent variables and their response times (RT).**

<u>T2 Variable</u>	<u>T2 Response Time</u>	<u>Correlation</u>
BI	BI RT	-.02
BW	BW RT	-.26*
Exemplar favorability	Exemplar favorability RT	-.07
Absolute PR	Absolute PR RT	-.26*
Conditional PR	Conditional PR RT	-.12

Note. \*  $p < .001$ .

When correlations were calculated separately by BI/BW group, slightly different results emerged (see Table 5). For the low/low group, the absolute PR variable was again negatively correlated with its response time ( $r = -.44, p < .001$ ). Also, BI was significantly correlated with its RT, such that the lower the participants' BI the more quickly they responded ( $r = .32, p < .02$ ). This correlation was nearly identical when controlling for BW RT ( $r = .33, p < .02$ ). For the high/high group, higher conditional PR scores were significantly correlated with shorter response times ( $r = -.35, p < .01$ ). For the at-risk group, only BW was significantly correlated with its RT (with higher BW associated with quicker responses,  $r = -.49, p < .001$ ), indicating that very willing participants spent a relatively short amount of time making their BW decision. When controlling for BI RT, the pattern was the same ( $r = -.42, p < .001$ ). The corresponding correlations between BI and BI RT were not significant, suggesting that there is a much stronger relation between BW and response time than between BI and response time. Table 6 presents these correlations between BW and BW RT and between BI and BI RT for the at-risk group.

**Table 5. Correlations between T2 dependent variables and their response times (RT) by BI/BW group.**

<u>Correlation</u>	<u>Low/Low</u>	<u>At-risk</u>	<u>High/High</u>
BI and BI RT	.32*	.06	-.14
BW and BW RT	-.02	-.49***	-.18
Exemplar favorability and exemplar favorability RT	-.11	-.09	.14
Absolute PR and absolute PR RT	-.44***	-.16	-.03
Conditional PR and conditional PR RT	-.12	.03	-.35**

Note. \*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .

**Table 6. Correlations between BW and BW RT and between BI and BI RT for the at-risk group.**

<u>T2 Variable and Response Time</u>	<u>Correlation</u>
BW and BW RT	-.49*
BW and BW RT, controlling for BI RT	-.42*
BI and BI RT	.06
BI and BI RT, controlling for BW RT	.11

Note. \*  $p < .001$ .

Hypothesis 4 stated that the at-risk group, in comparison to the other two groups, would respond more quickly to the dependent variables. There were no differences in response time due to the favorability of Zach or the social comparison tendency of the participants, so all of the RT analyses were collapsed across favorability condition and social comparison level.

The first analysis compared the standardized response times to BW and BI directly in a 2 (measure: BW RT vs. BI RT) X 3 (BI/BW group) ANOVA and revealed a significant group x measure interaction ( $F(2, 176) = 3.83, p < .03$ ). Examination of the simple main effects revealed that the BI RT was significantly faster than the BW RT for the low/low group ( $F(1, 59) = 4.51, p < .04$ ). The BW RT was faster than the BI RT for the at-risk and high/high groups, but these differences did not reach significance ( $ps > .12$ ).

**Table 7. Standardized BI RT and BW RT by BI/BW group.**

	<u>Low/Low</u>	<u>At-risk</u>	<u>High/High</u>
BI RT	-.15	.26 <sub>1</sub>	-.12 <sub>2</sub>
BW RT	.18 <sub>a</sub>	.16 <sub>3</sub>	-.34 <sub>4</sub>

Note. a = BW slower than BI within group,  $p < .04$ . 1 = at-risk slower than low/low,  $p < .03$ .  
 2 = at-risk slower than high/high,  $p < .04$ . 3 = at-risk slower than high/high,  $p < .01$ .  
 4 = low/low slower than high/high,  $p < .01$ .



To further explore the group x measure interaction, one-way ANOVAs were performed on BI and BW response times individually (see Table 8 for mean response times by BI/BW group). For BI RT, the ANOVA was significant ( $F(2, 179) = 3.31, p < .04$ ), and the follow-up pairwise comparisons showed that the at-risk group responded more slowly to the BI item than did the other two groups ( $ts < -2.30, ps < .04$ ), who did not significantly differ from each other ( $t = -.17, p > .85$ ). The ANOVA for BW RT was also significant ( $F(2, 179) = 5.60, p < .01$ ), and the pairwise comparisons revealed that the high/high group had shorter response times than did the other two groups ( $ts > 2.46, ps < .02$ ), who did not differ from each other ( $p > .70$ ).

For exemplar favorability RT, the ANOVA revealed a marginal main effect of BI/BW group ( $F(2, 179) = 2.94, p < .06$ ). T-tests indicated that the high/high participants (who evaluated Zach relatively favorably) responded to the exemplar favorability items more quickly than the low/low participants did ( $t = 2.42, p < .02$ ). However, the at-risk group did not significantly differ from either of the other two groups ( $ps > .10$ ).

The ANOVA for absolute PR response time revealed a significant main effect of BI/BW group ( $F(2, 176) = 3.97, p < .03$ ). Follow-up t-tests for this measure showed that the low/low participants (who reported the greatest perceived risk) answered more quickly than did both of the other groups ( $ts < -2.41, ps < .02$ ), who did not differ from each other ( $p > .90$ ). There was no main effect of BI/BW group for the response time to the conditional PR item ( $p > .10$ ).

**Table 8: Mean response times (in seconds) to T2 dependent variables by BI/BW group.**

	<u>Low/Low</u>	<u>At-risk</u>	<u>High/High</u>
BI RT	6.10	6.97 <sub>1</sub>	6.16
BW RT	4.82	4.80	3.90 <sub>2</sub>
Exemplar favorability RT	4.12	3.93	3.65 <sub>3</sub>
Absolute PR RT	4.70 <sub>4</sub>	5.42	5.40
Conditional PR RT	6.78	7.15	6.38

Note. 1 = at-risk slower than low/low and high/high,  $ps < .04$ . 2 = high/high faster than low/low and at-risk,  $ps < .02$ . 3 = high/high faster than low/low,  $p < .02$ . 4 = low/low faster than at-risk and high/high,  $ps < .02$ .

In sum, although there were some significant differences in response times between BI/BW groups, Hypothesis 4 was generally not supported because the at-risk group did not tend to respond more quickly to the dependent measures than the other two groups did. There is evidence, however, that BW was more strongly related to RT among the at-risk participants than it was among the other two groups. This suggests that, compared to others, when at-risk adolescents report greater willingness, they do so more quickly.

### **Exposure Time**

Hypothesis 5a predicted that the at-risk group would spend less time than the other two groups reading about STD information. In other words, the at-risk participants' exposure time to the second half of the article (which contained the information about STDs) was predicted to be shorter than that of the other groups. As with the response time analyses, there were no differences in exposure time due to the favorability of Zach or to participants' social comparison tendencies, so this analysis was collapsed across favorability condition and SC level. The one-way ANOVA revealed a significant main effect of BI/BW group ( $F(2, 179) = 6.94, p < .001$ ). The pairwise comparisons showed that the at-



risk group read the second half of the article more slowly than the other groups did ( $t_s > 3.8$ ,  $p_s < .01$ ). The high/high and low/low groups did not differ from each other ( $p > .45$ ).

Table 9 presents means and standard deviations by BI/BW group for the exposure time to the STD information.

**Table 9. Means and standard deviations for exposure time (in seconds) to STD information and to instructions by BI/BW group**

	<u>Low/Low</u>	<u>At-risk</u>	<u>High/High</u>
STD information	7.91 (1.33)	8.58 (1.32)	7.73 (1.35)
Instructions	4.20 (3.94)	3.31 (2.94)	4.84 (4.42)

To determine if this difference in reading time existed before the experimental manipulation occurred, a one-way ANOVA was performed on the reading time for the instructions that were presented before the article. It showed a marginal main effect of BI/BW group ( $F(2, 179) = 2.48$ ,  $p < .09$ ). Pairwise comparisons showed that the only significant difference among groups was that the at-risk group read the instructions more *quickly* than did the high/high group ( $t = 2.25$ ,  $p < .03$ ). Refer to Table 9 for means and standard deviations for the exposure time to the instructions by BI/BW group. Thus, although the at-risk group was the quickest to read the pre-manipulation instructions, it spent much more time reading the STD information than the other two groups did.

### **Recall of STD Information**

Hypothesis 5b suggested that the at-risk participants will, because of their less effortful processing, score more poorly on the STD recall items than participants in the other two groups will. The means and standard deviations for the scaled recall index are presented in Table 10. Recall accuracy and response time were significantly correlated

such that a greater number of correct answers was associated with faster response times ( $r = -.40, p < .001$ ).

**Table 10. Means and standard deviations for scaled STD recall accuracy index by favorability condition and BI/BW group.**

	<u>Low/Low</u>	<u>At-risk</u>	<u>High/High</u>	<u>Overall mean</u>
Positive favorability condition	1.86 (.99)	1.81 (.95)	2.13 (.85)	1.93
Negative favorability condition	1.87 (1.02)	2.03 (.85)	1.63 (.96)	1.85
Overall mean	1.87	1.92	1.88	1.89

Note. Possible range = 0 - 3.

3 (BI/BW group) x 2 (favorability condition) ANOVAs on both the scaled and open-ended recall indices revealed no main effects of BI/BW group or favorability condition ( $ps > .40$ ). The BI/BW group x favorability interaction approached significance for the scaled recall index ( $F(2, 176) = 2.37, p > .10$ ), but it did not for the open-ended recall index ( $p > .45$ ). In sum, there is no evidence that the at-risk group processed the risk information less thoroughly than the other two groups as Hypothesis 5 predicted.

## DISCUSSION

The present study sought to determine if an at-risk group of young men (i.e. those who were willing but not intending to engage in risk behavior) utilizes a different style of processing than do other groups when presented with risk information. This group of adolescents has been identified in previous research (e.g., Gibbons et al., 1998), but no work to date has specifically examined how they process risk information. More precisely, this study hypothesized that the at-risk adolescents would tend to employ an experiential processing style whereas others would not. Experiential processing tends to be relatively quick and requires relatively little effort. This processing style is influenced by affect, images, and heuristics. In contrast, rational processing involves greater effort and time and tends to be more deliberate, logical, and analytical than experiential processing.

Adolescents reporting high BW but low BI may be more at risk than others, including those that intend to engage in risk behavior. Because they are not intending to engage in risk behavior, these adolescents are less likely to take precautionary actions. However, many of these adolescents will eventually engage in risk behavior as a reaction to their social environments, as indicated by their high willingness. In a sense, these adolescents are similar to a group, identified by Gerrard (1982), who scored high on a measure of sex guilt. Adolescents with high sex guilt do not usually intend to have sex, but some eventually do. Because their sexual behavior is unplanned, they often fail to protect themselves from pregnancies and STDs. Thus, there is some health benefit to acknowledging one's intention to engage in risk behavior.

### Summary of Primary Results

The present study found very little evidence that the at-risk participants tended to use experiential processing more so than the other participants. If at-risk participants were processing via the experiential system, it would be expected that they would be more



influenced by the exemplar (Zach) and that this influence would manifest as change in BW and prototype/exemplar favorability (BI was not hypothesized to change significantly). However, at-risk participants did not show more change than the other two groups did in their BW or prototype/exemplar favorability in response to reading about Zach. In addition, analyses on the open-ended BW responses revealed no evidence that the at-risk group responded more experientially than did the other two groups. Consistent with the P/W model, there was some evidence that participants who scored high, as opposed to low, on SC were more responsive to the description of Zach. High SC participants gave the most favorable exemplar ratings in the positive favorability condition and the least favorable exemplar ratings in the negative favorability condition (although the simple effects were nonsignificant).

Furthermore, partial support was found for the prediction that change in prototype/exemplar favorability would predict change in BW and BI. For the at-risk vs. high/high group comparison, change in prototype/exemplar favorability from T1 to T2 predicted T2 BW and BI. This effect was stronger for BW than for BI, as the P/W model would predict. This implies that one way to reduce adolescents' BW and BI is through altering their prototypes. Providing adolescents with negative prototypes has been shown to reduce their BW (Blanton et al., 2001; Gerrard et al., in press) and should, theoretically, reduce subsequent risk behavior.

Surprisingly, as a whole, participants increased their BI from T1 to T2. Typically, the opposite pattern is found (i.e. participants report more conservative intentions in the experimental session than in mass testing). Examination of the mean scores by BI/BW group reveals that the low/low and at-risk group slightly increased their BI from T1 to T2, whereas the high/high group slightly decreased their BI from T1 to T2. Given that there were no main effects of favorability condition and no BI/BW group x favorability interaction

on BI, it appears that the overall increase in BI is due to regression to the mean rather than to the experimental manipulation. Some change in participants' scores (in the direction of the mean) is to be expected given that BI is not a completely stable construct, and many participants had relatively extreme T1 scores.

It was predicted that the at-risk group would avoid contemplating the negative consequences of casual sex and would, therefore, report the lowest absolute and conditional PR of the three groups. Instead, for both the absolute and conditional PR measures, the high/high group reported the lowest scores, and the low/low group reported the highest scores. Perhaps low/low participants, prior to the experiment, already perceived casual sex as very risky and were therefore strongly committed to abstaining from it. In contrast, the high/high participants were already relatively committed to engaging in casual sex, and it is possible that they reported low absolute and conditional PR as a way to rationalize their high BW and BI. Unfortunately, these explanations cannot be tested with the current data because measures of absolute and conditional PR were not included at T1. Thus, it cannot be determined if these differences between BI/BW groups existed before the experiment or were the result of the exemplar manipulation.

In addition, if at-risk participants were more likely than the other groups to process the STD information experientially, as opposed to rationally, they should have demonstrated poorer recall of the STD information. However, this was not the case; there were no significant differences between BI/BW groups in STD recall. Examination of the means revealed that the at-risk group had a slightly greater mean recall accuracy score than that of the low/low and high/high groups. Thus, if anything, at-risk adolescents may recall risk information better than other adolescents, an indication of more rational processing. Given the nonsignificance of this difference, firm conclusions about differences in recall cannot be made at this time.

### **Possible Problems with the Present Study**

One possible reason why the present study failed to find support for the hypotheses is that the manipulation of the favorability of Zach was too weak. Although the manipulation appeared to be successful (i.e. participants in the positive favorability condition did evaluate Zach more positively than participants in the negative favorability condition did), it may not have been strong enough to have the hypothesized effect on participants' BW. In the negative favorability condition, some participants' open-ended responses about their impression of Zach revealed that they did not perceive Zach to be as negative as he was meant to be perceived. For example, the negative version of Zach was intended to be perceived as aloof and relatively unfriendly, but many participants, when writing about Zach, described him as "shy" and "quiet." Perhaps participants were hesitant to judge Zach too harshly, and thus the manipulation did not have the intended effects.

There was also evidence of an unexpected effect in that, after reading about Zach, the negative favorability participants reported greater T2 BW and BI than the positive favorability participants did. Although these differences did not reach significance, they were clearly in the opposite direction of the hypothesis and may have been due to the negative favorability participants' not perceiving Zach very negatively. If the image of Zach was not particularly unfavorable, the participants would not have been very motivated to avoid adopting that image. Thus, they would not necessarily report lower BW to engage in the same behavior in which Zach engaged. Perhaps if the negative favorability participants had had more negative impressions of Zach, they would have reported lower BW (and perhaps BI) in comparison to participants in the positive favorability condition, as was expected.

It is also possible that negative favorability condition participants indicated greater T2 BW and BI as reaction to Zach's numerous sexual encounters. Although Zach is



described unfavorably, he nonetheless has had many sexual partners. Participants most likely thought more highly of themselves than of Zach, and perhaps they reasoned that they, too, could have more partners. They may have thought if Zach, a relatively unlikable person, could attract so many women, then they could probably do the same. Thus, they reported higher subsequent BW and BI to have casual sex. This explanation was not an *a priori* hypothesis of the current study, of course, and is therefore only speculative.

Another potential reason for the lack of evidence of experiential processing is the age of the participants in the present study. Participants were, on average, about 20 years old at the time of the lab session. Researchers have argued that rational processing tends to dominate over experiential processing as people mature (e.g., Epstein & Pacini, 1999). Although no exact age has been identified indicating when rational processing begins to predominate, it is possible that participants in the current study were old enough that their typical processing style is more rational than experiential. Thus, it may require more than a prototype/exemplar manipulation to induce experiential processing among this age group. Perhaps if this study were conducted with younger adolescents more evidence of experiential processing would be found.

### **Unexpected Differences in Response and Exposure Times**

Two areas where significant differences between the BI/BW groups emerged were the response times to the dependent variables and the exposure time to the second half of the article. Because experiential processing occurs more automatically and requires less time than rational processing, the prediction was that the at-risk group would respond and read more quickly than the other two groups. The differences between groups, however, were not in the predicted direction. In fact, the at-risk group spent significantly *more* time than the others reading the second half of the article (i.e. the STD information), suggesting that they were processing this information more rationally than experientially.

Overall, participants' responses were quicker for BW than for BI. However, the difference in response times is most likely due to the difference in the word counts of the BW and BI items (the BI item included 18 words, and the average of the two BW items was 7.5 words). The at-risk group was significantly slower to respond to the BI measure than were the other two groups. The high/high participants, not the at-risk participants, were the quickest to report their BW. The high/high group was also the fastest to respond to the exemplar favorability items, although the at-risk group did not differ significantly from either of the other two groups on this RT. For absolute PR, the low/low group responded significantly more quickly than did the high/high and at-risk groups.

#### Commitment vs. Ambivalence

In general, it appears that the more extreme their responses, the faster the participants responded. Thus, participants with the most extreme BI scores (the low/low and high/high groups) responded relatively quickly to that item. In contrast, participants who reported more middle-range responses (i.e. at-risk group's BW and BI responses) responded more slowly to those items. In this way, response times are an indirect measure of commitment to the BI or BW response. The more firm participants' decisions were, the less time they needed to process and the more quickly they were able to report those decisions. The low/low and high/high groups are clearly committed (to abstaining from and engaging in, respectively) the risk behavior. Thus, they spent relatively little time processing and responded to the measure quickly.

On the other hand, the at-risk participants are less committed to their BI and BW and, therefore, needed more time to deliberate. It took them a moderate amount of time to respond to the BW item, and they were the slowest of the three groups to respond to the BI item. Thus, rather than being committed to their decisions, the at-risk group appears to be quite ambivalent. Rather than experiential processing causing rapid response times (as

was predicted), it seems that the at-risk group's ambivalence causes relatively slow responses times, especially for BI. This evidence of the at-risk group's ambivalence is not surprising given that BI and BW are highly correlated, yet this group scores below the median on the former and above the median on the latter. It is likely that this discrepancy between attitudes slowed the at-risk group's processing.

The at-risk group's slower response times are inconsistent with the experiential processing hypothesis. However, they point to an important distinction between traditional dual-process models and the P/W model, which is considered a modified dual-process model. Whereas the experiential system tends to operate more quickly than the rational system, the social reaction pathway does not necessarily operate more quickly than the reasoned pathway. Often it is BI that is the more automatic response, and BW requires more thoughtful consideration. Thus, it may be that at-risk adolescents, who will likely follow the social reaction path to risk behavior, will not necessarily process information and make decisions relatively rapidly.

There was one indication of experiential processing among the at-risk participants, however. The at-risk group had a stronger correlation between BW and its RT than either of the other two groups did. In other words, greater BW was associated with faster responding more so for the at-risk group than for the other two groups. This suggests that when at-risk adolescents are very willing, they report their decision more quickly than when they are less willing. This finding may inform future efforts to identify adolescents who are most at-risk: those who are not at all intending to engage in risk behavior but are highly willing and, furthermore, decide their willingness hurriedly. Perhaps these adolescents will be the most likely to act impulsively when they find themselves in risk-conducive situations.



### **Implications for Interventions**

The differences in exposure time to the STD information and BI RT have implications for interventions targeted at at-risk adolescents. The finding that the at-risk participants spent more time reading about STDs indicates that they may be more interested in and motivated to learn about risk information than other adolescents are. If so, it is likely that interventions designed to educate at-risk adolescents about risky sexual behavior and STDs will succeed in dissuading them from engaging in the behavior. It is interesting that although they read the STD information more slowly, the at-risk participants' baseline reading time (i.e. exposure time to the computer instructions) was actually faster than the other participants' (although the at-risk group was only significantly faster than the high/high group). At the time of the computer instructions, participants were only informed that the article they were about to read was about health and relationships. Perhaps at-risk adolescents' initial reaction to health information is to proceed hastily; however, once they become engaged in the information they actually process it more thoroughly than others do. This remains purely speculative until research further explores these differences in exposure times.

The finding that the at-risk group spent more time than the other groups responding to the BI item suggests that these adolescents are ambivalent and uncertain about their plans to engage (or not engage) in casual sex. Furthermore, at-risk participants reported their BW more quickly than they reported their BI (though the difference was nonsignificant), suggesting that they were more deliberative and thoughtful in making a decision about their plans as opposed to their willingness. The apparent change in the at-risk group's BI from T1 to T2 may be due to the instability of these adolescents' attitudes rather than the influence of prototype/exemplar manipulation. Because at-risk participants are not committed to engaging in the behavior (i.e. their intentions are not concrete), they

should be relatively responsive to interventions. It is likely that this group can be educated about the risks associated with casual sex and the precautions to take to keep themselves safe and perhaps be persuaded to abstain from risky sex.

### **Conclusions and Future Directions**

Although the current study did not generally support the hypothesis that at-risk participants process risk information more experientially than others do, it did shed some light on at-risk participants' processing. It appears from this study that at-risk participants may sometimes process risk information more carefully than others do. The inconsistency of these adolescents' sexual attitudes may be evidence of their ambivalence rather than of their experiential processing. Rather than processing information quickly and making hasty decisions, the present study found some evidence that at-risk adolescents spend more time reading about risk information and deliberating about their intentions.

Given these findings, future research with this group of adolescents should have two primary aims. First, additional research is needed to more clearly determine if at-risk adolescents tend to process risk information more rationally than experientially. The present results on BI response time and exposure time need to be replicated and extended. Future research should further explore the differences in response times to BI and BW by utilizing items that have more comparable word counts. In addition, studies utilizing other measures of experiential processing could further reveal fundamental differences in processing style. For example, a common method of measuring experiential processing involves providing participants with vignettes describing two versions of a situation resulting in the same negative outcome for the protagonist (e.g., missing a flight by five minutes vs. missing a flight by 30 minutes) and asking participants under which circumstance the protagonist would be more upset (e.g., Denes-Raj & Epstein, 1994). Given that the negative outcome is the same in both cases, the rational response is that

there should be no difference in the protagonists' reactions. People, when responding experientially, however, will typically say that the person who experienced the near-miss will be the more upset of the two. The frequency with which people respond in this heuristic pattern is used as a measure of their tendency to make judgments from the experiential system. This measurement paradigm could be adapted to include participants' responses to vignettes describing health-risk scenarios (e.g., contracting an STD after having sex with one casual partner vs. after having sex with multiple casual partners). A study employing this method would provide a more direct investigation of to what extent at-risk adolescents use rational vs. experiential processing in regard to risk information.

Secondly, future research should focus on the potential for successful interventions with this group of adolescents. If at-risk adolescents will attend to and more thoroughly process risk information, as the present study suggests they will, then they should be more receptive to interventions designed to discourage risk behavior. To test this hypothesis, new research should more explicitly attempt to dissuade at-risk adolescents from engaging in risk behavior and measure their change in BI and BW. Furthermore, a longitudinal study could examine whether or not an intervention has long-term effects on at-risk adolescents' behavior (i.e. do at-risk adolescents who receive the intervention continue to refrain from the risk behavior?). To have the greatest chance for success, future interventions should identify these at-risk adolescents at a young age before they engage in risk behavior and while their BI is still relatively low. In sum, gaining more knowledge about how at-risk adolescents process risk information will shed light on the best way to prevent these adolescents from engaging in risk behavior.



**FOOTNOTES**

1. The fourth possible group (adolescents who reported high BI and low BW) was not included because intention to engage in a behavior necessarily implies willingness. Thus, this group is paradoxical and not of interest to the present study.

**APPENDIX A: FIRST HALF OF ARTICLE (POSITIVE FAVORABILITY CONDITION)**

*As we said before, we are doing a study, with the help of the journalism department, using news articles to study the psychology of writing. You will read one of a dozen articles that we are evaluating in terms of writing and audience impact. Some of the articles will appear as a special series on health and relationships for the Daily next spring. The following article is about an ISU student, but his name has been changed to protect his privacy. Please read the article carefully. You will be asked to answer several questions as you go along.*

In a lot of ways, Zach is a typical Iowa State sophomore. An avid Cyclone fan, he grew up in Iowa and planned at an early age to come to ISU for college. When I first met Zach for this assignment, I was struck by his good natured personality. He's willing to talk openly about his life and seems to have a very laid back attitude. Zach is a serious student. He was on the Dean's List both semesters last year and is well on his way to making it three in a row. When asked about his plans beyond college, Zach says he'd like to apply to graduate school. He realizes he needs to work hard to keep up his GPA. Luckily, Zach seems to have found a good balance between work and play.

He recently joined a fraternity that keeps his social calendar full. Whether walking to class or eating at the MU, Zach spends most of his day surrounded by friends. He is clearly the leader of his group, and all eyes are him as he entertains his friends with funny stories about his old pick-up or the latest mishaps in his chemistry lab. By all accounts, Zach is just as popular with women as he is among his frat brothers. When I asked his friends if Zach has a steady girlfriend, they laughed and said he's had lots of girlfriends (actually, the exact expression they used was that Zach "hooks up a lot" – usually with very attractive women), but none of these relationships lasted very long. When I later asked Zach about his friends' comments, he laughed and said he's not planning on getting married anytime soon, so he doesn't see the point in starting a long term relationship, at least for now.

In addition to his fraternity activities, Zach keeps busy by participating in intramural basketball (he was his team's highest scoring player last semester) and by holding down a part time job on campus. Zach's been working at the library for the past few months. He says the job is all right, but he's thinking of looking for something new for a change of pace.



**APPENDIX B: FIRST HALF OF ARTICLE (NEGATIVE FAVORABILITY CONDITION)**

*As we said before, we are doing a study, with the help of the journalism department, using news articles to study the psychology of writing. You will read one of a dozen articles that we are evaluating in terms of writing and audience impact. Some of the articles will appear as a special series on health and relationships for the Daily next spring. The following article is about an ISU student, but his name has been changed to protect his privacy. Please read the article carefully. You will be asked to answer several questions as you go along.*

In a lot of ways, Zach is a typical Iowa State sophomore. When I first met Zach for this assignment, he didn't seem very enthusiastic about it, saying he usually prefers not to share his life with "total strangers." However, he opened up a bit as time went on. Whether walking to class or eating at the MU, Zach spends most of his time alone or with one or two friends. Although he's not unsociable, one gets the distinct impression that Zach doesn't care very much what others think of him and doesn't bend over backwards to be friendly to people. In his chemistry class, Zach sits rather inattentively in the back of the hall, barely writing down notes. Later he mentions that he often misses class and seems unconcerned with the effect that might have on his GPA. Asked about his plans beyond college, Zach shrugged and said he hadn't thought about it much. When I asked his friends if Zach has a steady girlfriend, they laughed and said he's had many (actually, the exact expression they used was that Zach has "hooked up" with a lot of girls), but none of these relationships lasted very long.

When I later asked Zach about his friends' comments, he laughed and said he's not planning on getting married any time soon, so he doesn't see the point in any long-term relationships right now. Zach keeps busy by participating in intramural basketball. By all accounts, he's an average player, but one who is very competitive and doesn't take losing lightly. He also fills his time by holding down a part time job on campus. Zach's been working at the library for the past few months. He says the job is all right, but he's thinking of looking for something new for a change of pace.

### APPENDIX C: QUESTIONNAIRE 1

*Before moving on to the rest of the article, we would like to get your impression about what you have just read.*

*Using the scale below, please rate the article on the following dimensions.*

	1	2	3	4	5	6	7	
	Very Poor			Neutral			Excellent	
Writing style		1	2	3	4	5	6	7
Organization		1	2	3	4	5	6	7

*Using the scale below, please rate the person described in the article on each of the following traits.*

	1	2	3	4	5	6	7		
	Not at all			Neutral			Extremely		
smart		1	2	3	4	5	6	7	
funny		1	2	3	4	5	6	7	
immature		1	2	3	4	5	6	7	
kind		1	2	3	4	5	6	7	
“cool” (sophisticated)		1	2	3	4	5	6	7	
insecure			1	2	3	4	5	6	7
careless			1	2	3	4	5	6	7
attractive			1	2	3	4	5	6	7
dull (boring)			1	2	3	4	5	6	7

**APPENDIX D: SECOND HALF OF ARTICLE (BOTH CONDITIONS)**

*Now please continue reading the remainder of the article.*

Most people would probably see Zach as a typical college student, but there is one important aspect of Zach's life that you wouldn't necessarily know just by looking at him or even by spending time with him. Just last week, during a routine doctor's visit, Zach became one of the 15 million Americans who were diagnosed with a sexually transmitted disease (STD) this year. Zach is now among the roughly 20% of the population who will contract at least one STD in their lifetime. STDs are a major health concern among young adults. Nationwide, at least 50% of STDs occur in people under the age of 25. Like many people, Zach thought that because he never experienced any STD symptoms that he was not infected. In fact, 40% of sexually transmitted infections in men are without symptoms. Unfortunately, because STDs can often go undetected, many people unknowingly infect their partners. Zach, like so many people, will live with his disease for life because, although it is treatable, it is not curable.

Zach agreed to share his experience to help raise awareness of STDs at Iowa State. Recalling that day at the doctor's office, he said the diagnosis came as shock to him. Although he can't be sure when exactly he contracted the disease, Zach thinks it happened about a month ago. He said it was hard to tell his parents because he knew they would be upset, but he felt a little better after he told them. Zach has decided not to tell his friends about his STD yet because he's embarrassed and is afraid they won't understand what he's going through. Zach is also worried about how he'll tell a girl he dates in the future about his disease. He says that even if she really likes him, it'll probably be hard to accept that he has an STD. Zach knows that with medication he'll be fine, but he'll always have to deal with the fact that he has an STD.



## APPENDIX E: QUESTIONNAIRE 2

*Next we'd also like to learn a little about the reading audience (you). Moving on from the article you just read for the time being, please answer the following questions about yourself.*

What year in school are you?      freshman    sophomore    junior    senior

Are you currently sexually active?    Yes                  No

*Please try to imagine yourself in the following situation (whether or not you think you would ever be in such a situation). Then, please answer the questions as honestly as you can.*

Suppose you are not currently in a relationship, and you're at a party where you meet a woman for the first time. You think that she is very attractive, so you start talking to with her. The two of you hit it off right away and you spend the rest of the time at the party flirting and joking with her. At the end of the evening, you go with her to her apartment. You start making out, and you're feeling as if you might like to have sex with her. She obviously feels the same way. How willing would you be to do each of the following?

1	2	3	4	5	6	7
Not at all willing			Maybe			Very willing

Stay at her apartment and have oral sex.

Stay at her apartment and have sex.

Stay at her apartment, but don't have sex.

In the next 6 months, are you intending to have sex with someone you are not exclusively dating?

1	2	3	4	5	6	7
<b>Definitely not</b>			<b>Neutral</b>			<b>Definitely</b>

*Finally, please answer a few more questions about the news article.*

What are your impressions of Zach? Please write as much as you can. Complete sentences and proper grammar are not important. Just put as many thoughts down about Zach as possible.

What information about STDs do you remember from the article? Again, please write as much as you can. Complete sentences and proper grammar are not important.

How risky do you think casual sex is?

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
<b>Not at all</b>			<b>Neutral</b>			<b>Extremely</b>

If you were to have casual sex, what do you think the chances are that you would get an STD?

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
<b>Very slim chance</b>			<b>Neutral</b>			<b>Very good chance</b>

Think back to the scenario you read a few minutes ago in which you met a woman at a party and you were asked whether or not you would be willing to have sex with her. When making this decision, what specific things did you think about? In other words, what considerations influenced your decision?

Among sexually transmitted infections in men, what percentage occurs without symptoms?

At least 50% of the occurrences of STDs occur in people under what age?

What percentage of the population will contract at least one STD in their lifetime?

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